

# REDISCOVERY OF *LESQUERELLA PALLIDA* (CRUCIFERAE)

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In 1981, while searching for *Leavenworthia aurea* Torrey on Weches Formation outcrops, we collected a white-flowered *Lesquerella* that was later identified as *Lesquerella pallida* (Torrey & Gray) Watson. The *L. pallida* population inhabited an open grazed pasture associated with a Weches outcrop about 8 miles west of San Augustine, Texas. Some plants were actually growing on the Weches soil. This species was initially collected by Dr. M. C. Leavenworth in the 1830's on small prairies near San Augustine. Until now, no collections appear to have been made anywhere since the original one by Leavenworth (Rollins and Shaw, 1973). Because it had not been relocated and because of questionable flower color not adequately shown by the type specimen, Rollins and Shaw (1973) considered it a slightly anomalous specimen of *L. gracilis* (Hook.) Watson.

## HABITAT

As mentioned, *L. pallida* is found on and nearby outcrops of the Weches Geologic Formation, which are generally exposed on hillsides. This formation usually consists of calcareous marine sediments underlain by a grayish-green layer composed of the clay mineral glauconite. As a result of the impermeability of this glauconite layer, Weches outcrops are seepy and wet much of the year. These characteristics result in a rather unique habitat as evidenced by Weches endemics in eastern Texas such as *Leavenworthia aurea*, *Lesquerella pallida*, and *Sedum pulchellum*. Plant species associated with *L. pallida* at the time of its flowering were *Allium drummondii*, *Arenaria drummondii*, *Astranthium intergrifolium*, *Cacalia plantaginea*, *Melilotus indicus*, *Phalaris caroliniana*, *Satureja arkansana*, and *Valerianella radiata*.

The evident association of *L. pallida* with the Weches Formation may be a result of soil chemistry. The basic pH (7.1–7.2) and generally high levels of most exchangeable ions, especially Ca and Mg (Table 1) are in contrast to the acid, sandy, leached soils usually encountered in eastern Texas. It appears that *L. pallida* is a heliophyte and thus may be present on Weches

TABLE 1. Physical and chemical properties of Weches and adjacent pasture soils.

Location	Sand	TEXTURE (%)			TEXTURAL Class	pH
		Silt	Clay			
Weches	78	8	14		Sandy loam	7.1
Pasture	51	27	22		Sandy clay loam	7.2

	EXCHANGEABLE IONS (PPM)						
	P	K	Ca	Mg	Fe	Mn	Zn
Weches	13	170	>6000	>400	>10	3	0.2
Pasture	12	230	4900	>400	>10	>5	0.4

and adjacent pasture areas because they are treeless. Weches outcrops are naturally treeless in forested eastern Texas, providing habitat for shade intolerant species. Forests, in contrast, are migration barriers in these circumstances and may be the prime factor causing the limited distribution of *L. pallida*. Some migration has occurred into adjacent cleared pastureland. This pastureland, however, appears to have soil characteristics similar to those of the Weches outcrop (Table 1).

#### POPULATION SIZE

Because the Weches Formation is a rather narrow layer, *L. pallida* is distributed as a band of plants covering approximately 2.02 ha (5 acres). We counted 3,319 plants in this area. We searched other Weches outcrops for the occurrence of *L. pallida* but other populations have not been found.

#### LESQUERELLA PALLIDA vs. LESQUERELLA GRACILIS

*Lesquerella pallida* was first recognized as a variety in 1838 by Torrey & Gray. It was, however, described as a variety of *Vesicaria grandiflora*, an auriculate species of loose sandy soils in southern and central Texas. In 1840 Torrey & Gray elevated *V. pallida* to a species of *Vesicaria*. Watson (1888) erected the genus *Lesquerella* and at the same time transferred *pallida* from *Vesicaria*, an old world genus, to *Lesquerella*. Rollins & Shaw recognized *L. pallida* as a good species in their treatment of *Lesquerella* in Correll & Johnston (1970).

Flower color is a distinguishing characteristic: *L. pallida* has white petals with a yellow base (Fig. 1), and *L. gracilis* has yellow petals. The two species have also been separated based on pedicel features: *L. pallida* has recurved

pedicels, and *L. gracilis* has ascending to spreading, straight pedicels (Correll & Johnston, 1970). Although useful, this character does not appear to be constant. The upward curvature of the stipe of *L. gracilis* is a more con-

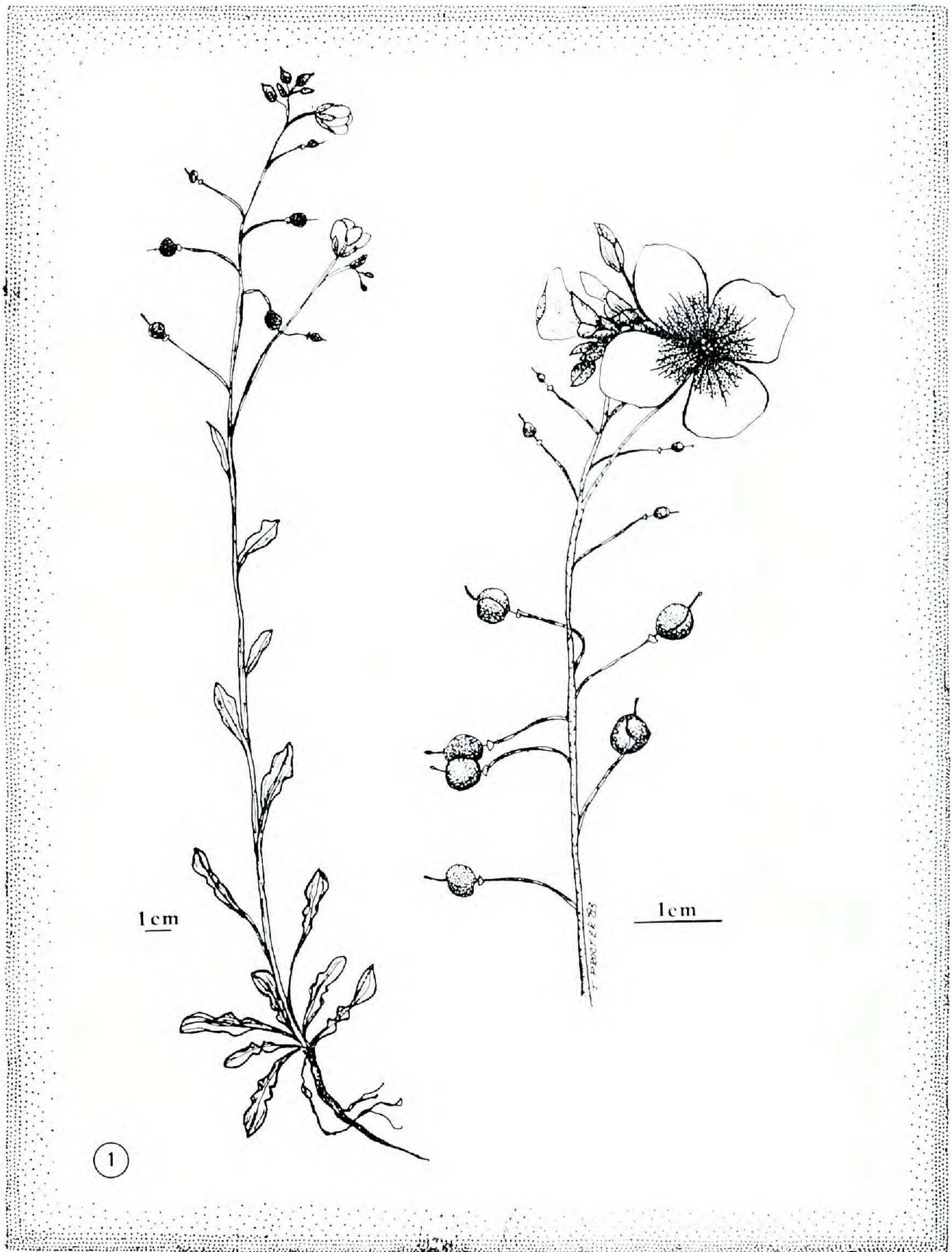


Figure 1. *Lesquerella pallida* (from Nixon & Ward, 10665, Nixon et al. 11784, and photographs).



Figure 2. Trichomes of *Lesquerella pallida*.

sistent difference. Ovules of *L. pallida* average 4–6 per locule while those of *L. gracilis* average 8–10 per locule. Silicles of *L. pallida* appear to be larger on the average than those of *L. gracilis*.

Of interest are the differences in habitat. Herbarium labels and field work indicate that *L. gracilis* is generally found along roadsides, fencerows, and railroad embankments on limestone gravel and clay soils. Its nearest location to *L. pallida* is about 100 miles west. *Lesquerella pallida*, as discussed earlier, is associated with a unique geologic formation which is quite wet much of the year. However, all the factors causing its restricted distribution are not known.

We determined the chromosome number of *L. pallida* by squashing anthers in aceto-orcein stain. Microsporocyte counts indicate  $n=6$  (*Nixon et al 11784*, ASTC). *Lesquerella gracilis* is also reported to have a chromosome number of  $n=6$  (Rollins, 1966).

Preliminary studies on the two species' flavonoid profiles, as determined by paper chromatography, indicate they are distinctive. The flavonoid patterns are distinctive for both leaf and floral tissue (SMU: *L. PALLIDA*: *Nixon et al 11784*; *L. GRACILIS*: *Barnette 35*, *Lundell & Lundell 10318*).

#### DESCRIPTION

The original description of *L. pallida* was based on Leavenworth's specimen. Payson (1922) monographed *Lesquerella* and compiled his description from the original publication in Torrey and Gray's 'Flora' 1: 101. 1838. Since this is the first collection of this species since the 1830's, a new description follows based on flowering and fruiting specimens observed both in the herbarium and field.

*LESQUERELLA PALLIDA* (Torrey & Gray) S. Watson. Proc. Amer. Acad. 23: 253. 1888.

*Vesicaria grandiflora* Hook. var. *pallida* Torrey & Gray, Fl. N. Amer. 1: 101. 1838.

*Vesicaria pallida* (Torrey & Gray) Torrey & Gray, Fl. N. Amer. 1: 668. 1840.

An erect to spreading annual (?) usually branching at the base and/or in the upper parts, 5–60 cm tall; root system a small tap root (to 5 mm wide at the top) with lateral branches; stems slender (to 5 mm wide at the base), yellowish green to grayish green, sometimes reddish near the base with the reddish color extending upward on the upper side of the stem, decumbent to erect; leaves exstipulate, yellowish green to grayish green, linear to oblong to oblanceolate, entire to dentate, sometimes undulate, variously pinnately lobed in basal leaves, tips acute to obtuse to round, bases mostly attenuate, stellate pubescent on upper and lower surfaces, basal leaves to 10 cm long and 2 cm wide with petioles to 4 cm, cauline leaves gradually reduced upward, becoming sessile, extending into the inflorescence; inflorescences to 33 cm long, flowers solitary (in very small plants) or in

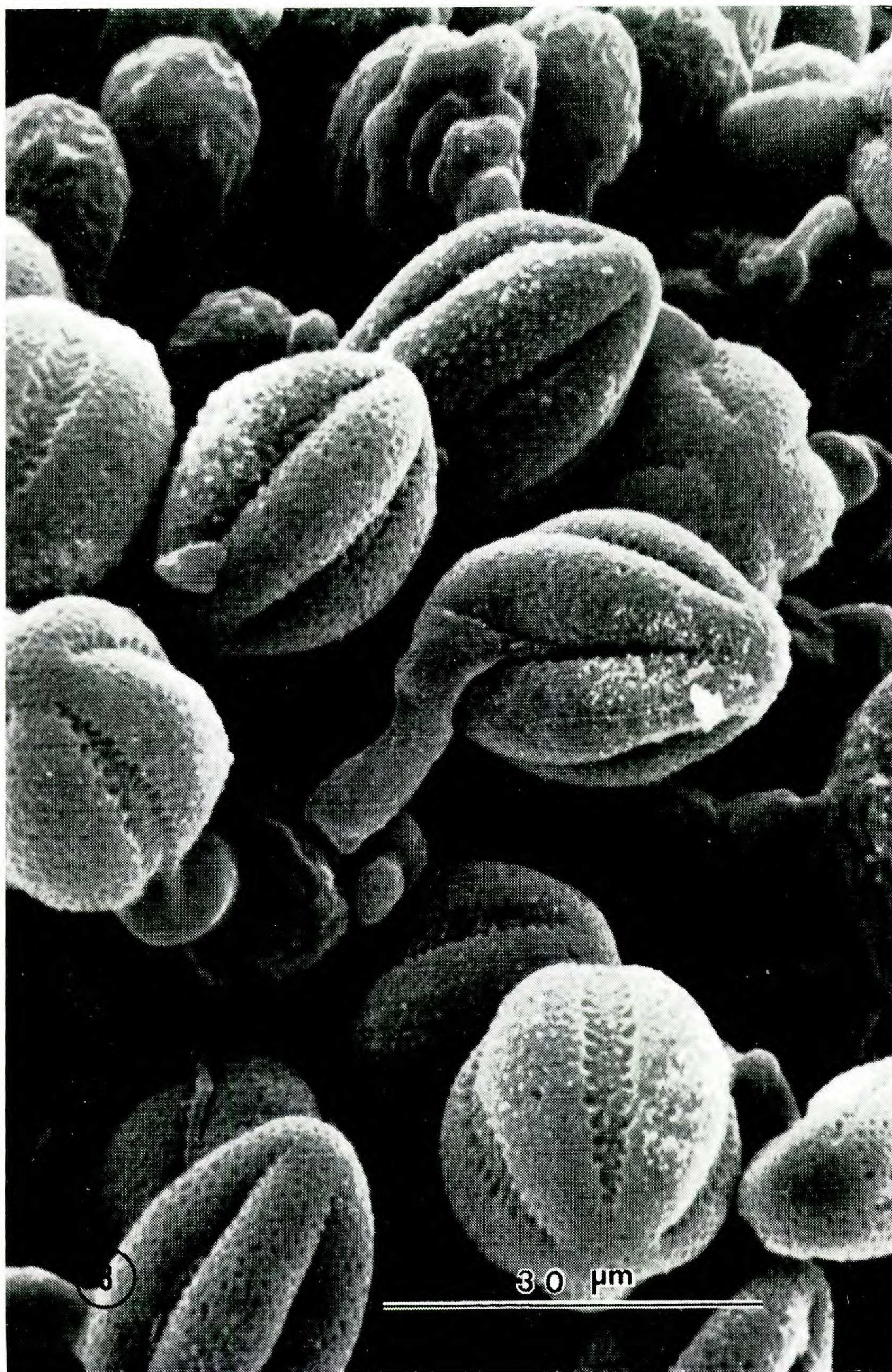


Figure 3. Pollen grains of *Lesquerella pallida*.

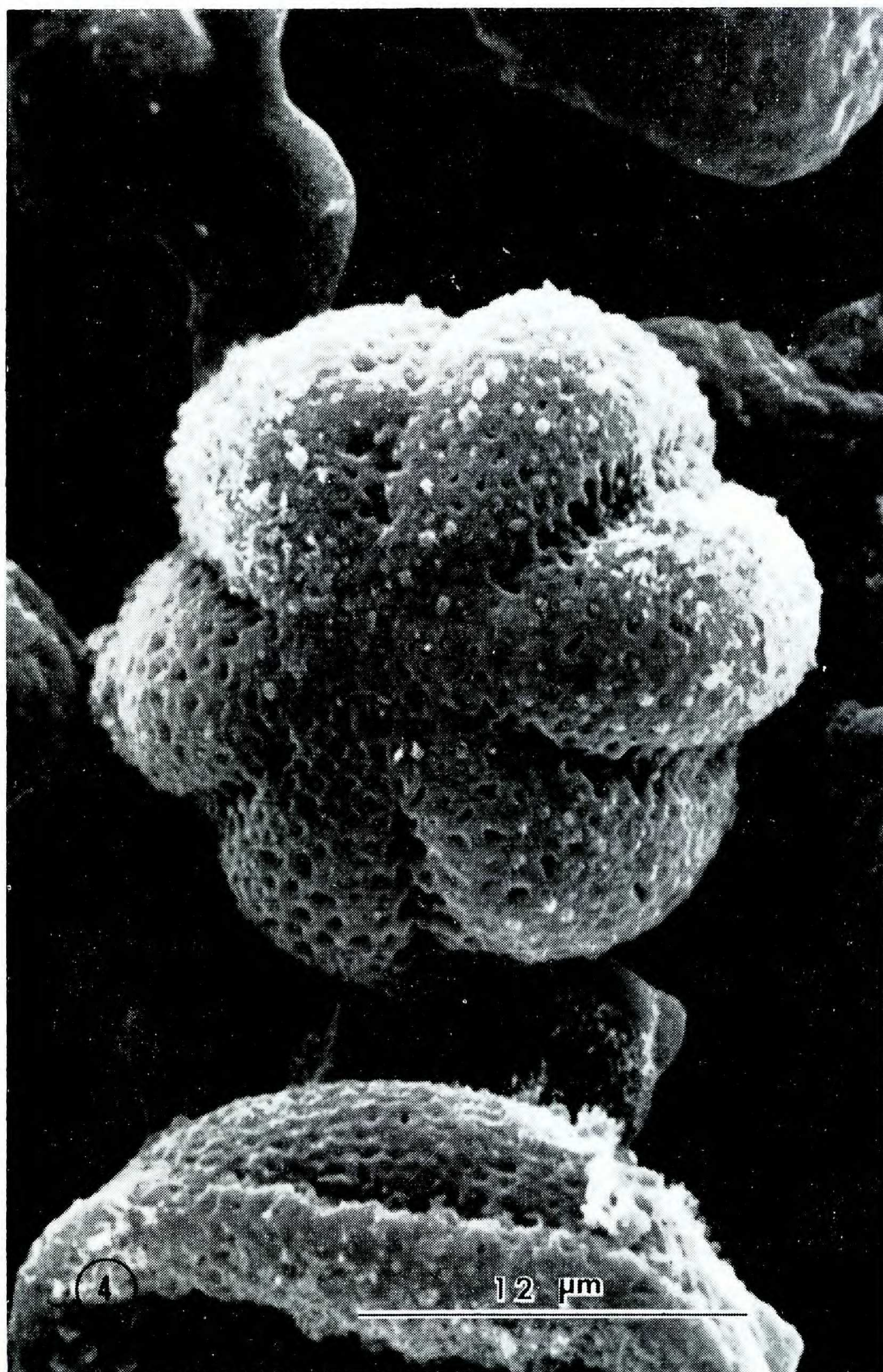


Figure 4. Polar view of a pollen grain of *Lesquerella pallida*.

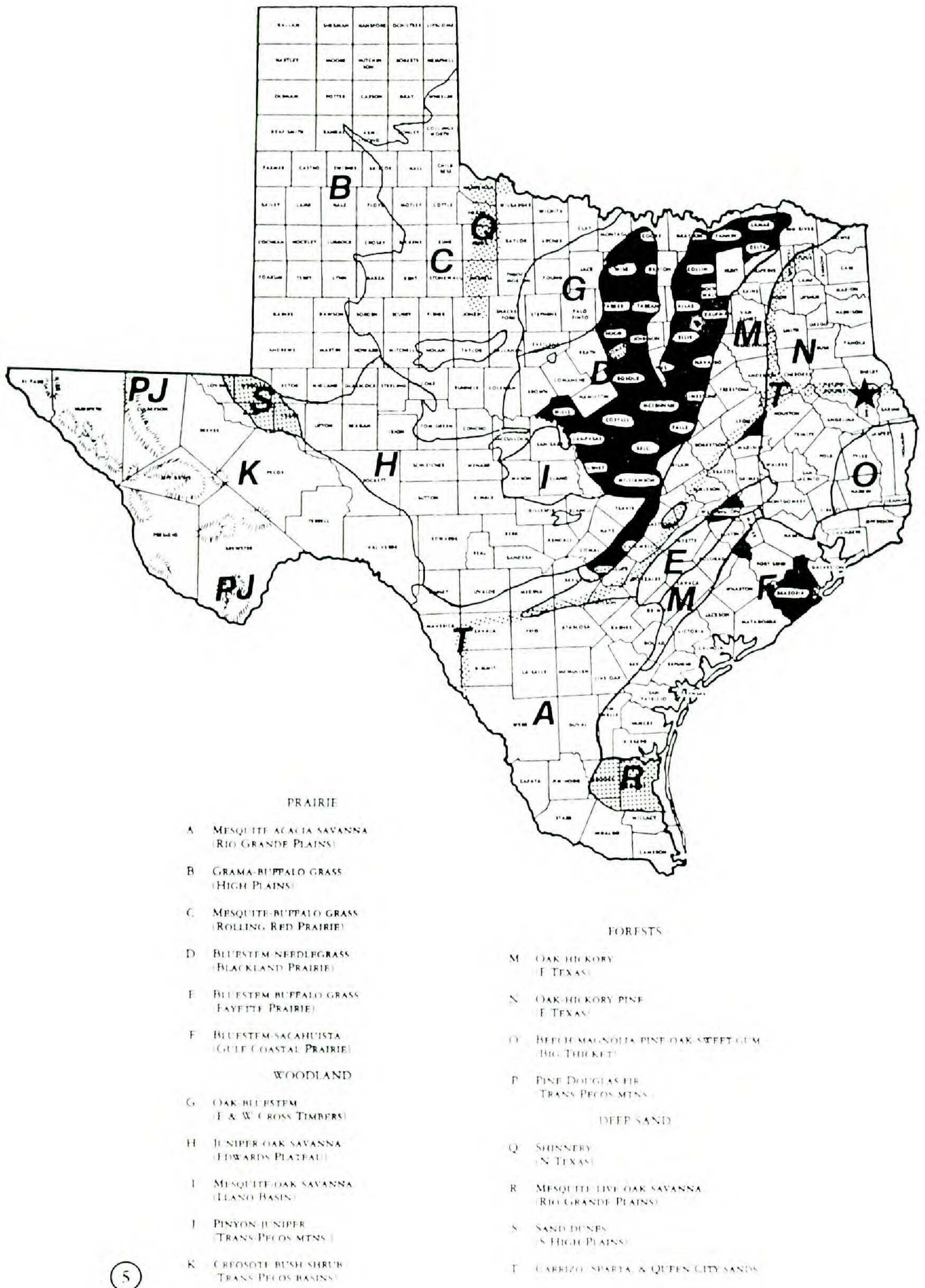


Figure 5. Distribution of *Lesquerella pallida* (star) and *L. gracilis* (shaded area) based on collections at SMU and data from Rollins & Shaw (1973).



racemes, racemes to 16 cm long and containing up to 24 flowers; pedicels to 18 mm long, slightly recurved at maturity; sepals 4, greenish in the bud, becoming cream colored to yellowish orange with maturity, hyaline margined, to 5 mm long and 2 mm wide, acute, sessile, stellate, oblong to narrowly ovate; petals 4, white with a yellow base and brownish to olive colored veins, to 12 mm long (the yellow base to 5 mm long) and 8.5 mm wide, broadly ovate, narrowing somewhat abruptly to a narrow (about 1 mm long) base, glabrous; stamens 6, tetradynamous, filaments to 4.8 mm long, anthers bright yellow, versatile, to 2 mm long, pollen 5 colpate rarely 6 colpate; pistils (in flowers) to 5 mm long and 1.5 mm wide, ovaries to 2.3 mm long, styles to 3.1 mm long, stigmas to 0.5 mm long; fruits (silicles) globose to ellipsoid, stipitate (stipes to 1.2 mm long), to 5.5 mm long and 6 mm wide, glabrous; ovules usually 4–6 per locule; seeds 2 mm long and 1.6 mm wide, flattened (Figs. 1-4).

Distribution (Fig. 5). Endemic to the Weches Geologic Formation outcrops, San Augustine County, Texas. Flowering April and May.

TYPE: TEXAS. San Augustine Co.: small prairies near San Augustine, M. C. *Leavenworth s.n.*, probably 1837–1838 (HOLOTYPE: NY, microfiche SMU!; fragments of type: GH).

Specimens examined: TEXAS. San Augustine Co.: open pasture area of Weches Formation outcrop, 8 mi W of San Augustine on Hwy 21 and 1 mi S, 10 Apr 1981, *Nixon & Ward 10665* (ASTC, SMU); 16 Apr 1982, *Nixon et al 11784* (ASTC, SMU).

#### CONCLUSIONS

The rediscovery of *L. pallida* indicates that the taxon is reproductively and geographically isolated from other *Lesquerella* species. Its habit, habitat, range, and chemical distinctness distinguish it from *L. gracilis*.

#### ACKNOWLEDGEMENTS

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